

TWO NEW SPECIES OF *MONOTOCA* (EPACRIDACEAE) ENDEMIC IN VICTORIA

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ABSTRACT

David Albrecht, Two new species of *Monotoca* (Epacridaceae) endemic in Victoria. *Muelleria* 8(3): 299–306 (1995). — *Monotoca oreophila* and *Monotoca billawinica* are described and illustrated, with notes on distribution, conservation status, habitat and relationships with other species of *Monotoca*.

INTRODUCTION

A revision of the genus *Monotoca* is currently being completed and it is apparent that several segregate taxa are without epithets. This paper validates two new names so that they may be included in a treatment of the genus for the forthcoming *Flora of Victoria*.

The two species described herein have female and functionally male flowers on separate plants. In female flowers the stamens are reduced to antherless staminodes. Floral measurements are based on fresh or rehydrated material and it should be noted that some shrinkage occurs when flowers dry. The terminology used to describe inflorescence structures largely follows Briggs and Johnson (1979). The term seasonal growth unit (SGU) refers to the shoot or system of shoots formed within a single growing season and arising from an axis formed in a previous growing season. The first few 'juvenile' leaves within a SGU are often broader, more obtuse apically and differently shaped than leaves that appear subsequently. These leaves are not considered in the descriptions. For consistency, leaf descriptions are based on leaves taken from the middle section of the previous seasons SGU as are measurements of leaf density. When uniflorescences are spicate, the length of the primary axis of the uniflorescence (hereafter called the peduncle) is measured as the distance between the base of the peduncle and the lowermost bract (sterile or fertile).

TAXONOMY

Monotoca oreophila Albr. sp. nov.

Monotoca ellipticae (Smith) R.Br. et *Monotoca alberti* R.Br. affinis ab ambabus conflorescentibus blastotelicis et gemmis hornotinis majoribus differt: ab *M. ellipticae* foliis brevioribus angustioribus congestioribus, tubo corollae et anthera brevior et habitatione montano vel subalpino, et ab *M. alberti* corolla alba vel crema et foliis congestioribus differt.

TYPUS: Victoria, Snowfields, Mt Wellington summit, 13 Dec. 1988, *D.E. Albrecht 3728* [HOLOTYPE (functionally male): MEL 2016696; ISOTYPI (functionally male): HO, NSW; PARATYPE (female): MEL 2018951; ISOPARATYPI: HO, NSW.]

Densely foliose non-lignotuberous shrub, procumbent to erect, 0.2–2.5 m high; bark persistent, ultimately rough and fissured; current seasons branchlets brown, reddish-brown or maroon, with an indumentum of minute stiff spreading hairs 0.05–0.1 mm long or almost glabrous, glabrescent by second year. *Leaves* dense (5–15 per cm), ascending or spreading, leaving prominent scars after abscission, convex, lanceolate to elliptic, 3.8–11 mm long, 1.4–2.8 mm wide, upper surface green and glabrous, lower surface distinctly whitish (due to numerous wax-covered papillae) and usually with conspicuous \pm branched subparallel-palmate veins; margins slightly recurved; apical mucro 0.2–0.6 mm long, weakly pungent; petiole 0.5–1.1 mm long, glabrous on both surfaces. *Overwintering SGU buds* large, enclosing SGU axis with flower buds and

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rudimentary leaves; scales glumaceous, tinged reddish-brown, later turning brown. *Conflorescence* consisting of single-flowered axillary uniflorescences (lacking a subsidiary rudimentary bud) borne along the proximal section of current seasons SGU, leafy portion of SGU growing out while plants still flowering, SGU meristem very rarely aborting and the conflorescence simulating a short raceme; peduncles 0.2–1.7 mm long, \pm puberulent; bracts caducous or persistent and leaf-like; bracteoles 0.5–1.1 mm long, inserted immediately or shortly below the sepals; female and functionally male flowers on separate plants. *Sepals* 5, 0.6–1 mm long, ciliolate. *Corolla* 5-lobed, whitish-cream, campanulate, slightly compressed laterally in bud with the lobes imbricate distally, 1.4–2.5 mm long in male flowers including tube 0.4–0.8 mm long; 1.1–1.9 mm long in female flowers including tube 0.4–0.6 mm long; lobes spreading or recurved, \pm slightly thickened at apex, glabrous or very rarely sparsely papillose. *Anthers* 0.8–1.2(–1.3) mm long, attached at or above the midpoint on short filaments, exerted from the corolla tube of male flowers, not becoming deeply concave abaxially after dehiscence; stamens reduced to filaments in female flowers. *Nectary* annular, 0.1–0.3 mm long, \pm slightly lobed. *Ovary* 1-locular, tapering to a short style and small lobed stigma, together 0.7–1

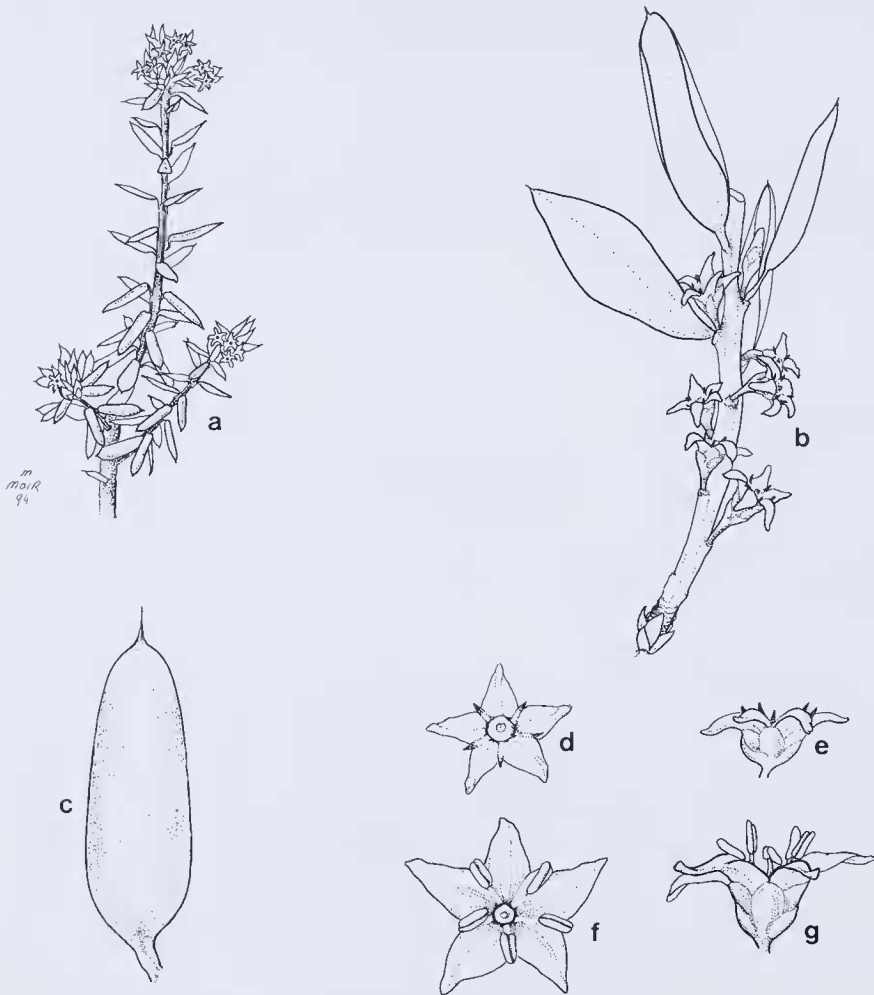


Fig. 1. *Monotoca oreophila*. a — flowering branch, $\times 1$. b — proximal part of conflorescence with single-flowered uniflorescence, $\times 4$. c — leaf, $\times 10$. d & e — female flower, $\times 6$. f & g — functionally male flower, $\times 6$. All drawn from D.E. Albrecht 3728.

mm long. *Drupe* red-orange when fully ripe, ovoid, 2.2–3 mm long (excluding style). (Fig. 1)

FLOWERING PERIOD

November to January

FRUITING PERIOD

January to April

ETYMOLOGY

The specific epithet is derived from the Greek *oreo-*, mountain-, and *phileo*, I love, referring to the habitat in which the species is found.

REPRESENTATIVE SPECIMENS (51 specimens examined)

Victoria — 1.6 km SE of the summit of Mt Useful, 12 Dec. 1988, *D.E. Albrecht* 3727 (MEL 2016695, HO, BRI, AD, K, MO); 1 km SE of Mt Kernot, Baw Baw Plateau, 15 Dec. 1981, *N.G. Walsh* 891 (MEL 628515); Mt Wellington, just N of summit, 20 Nov. 1980, *N.G. Walsh* 924 (MEL 628606, NSW, CBG, HO 64096, BRI 303211); Summit area of Mt Kent, 18 Mar. 1992, *N.G. Walsh* 3418 (MEL 2018972, NSW); 200 below Mushroom Rocks, Mt Erica, 29 Nov. 1990, *J. Davies & K. Lester s.n.* (MEL 2014372, HO, AD); Ellery Creek, c. 1 km S of Mt Tyers, Apr. 1991, *J. Davies s.n.* (MEL 2015518); Nelson's Crag (The Watchtower), c. 7 km E of Snowy Range airstrip, 13 Dec. 1988, *D.E. Albrecht* 3729 (MEL 2016697, CBG, NSW); Baw Baw alpine reserve, top of Big Hill, 7 Dec. 1984, *I. Salasoo* 1 (MEL 668601).

DISTRIBUTION AND CONSERVATION STATUS

Monotoca oreophila is a Victorian endemic, occurring on relatively few mountains in the Snowfields natural region (Conn 1993) from Mount Baw Baw northeast to Mount Kent (Fig. 2). Gullan *et al.* (1990) regarded this taxon as rare in Victoria. All eight populations presently known occur in biological reserves though most are very localised and some consist of few plants.

HABITAT

Monotoca oreophila is exclusively a montane-subalpine species occurring at altitudes of 1000–1620 m. All known sites are rocky, often with surface boulders. Occurrences of *M. oreophila* do not appear to be associated with a particular rock type, as populations occur on granodiorite, sandstone, rhyolite and conglomerate.

Most populations occur under an open canopy of eucalypts though occasionally trees are absent and the vegetation is of a heathland or shrubland structure. Associated *Eucalyptus* species are *E. pauciflora*, *E. glaucescens*, *E. kybeanensis* and rarely also *E. delegatensis* and *E. nitens*. Frequently associated understorey species include *Tasmania vickeriana*, *Leucopogon gelidus*, *L. maccraei*, *Olearia megalophylla* and *Dianella*

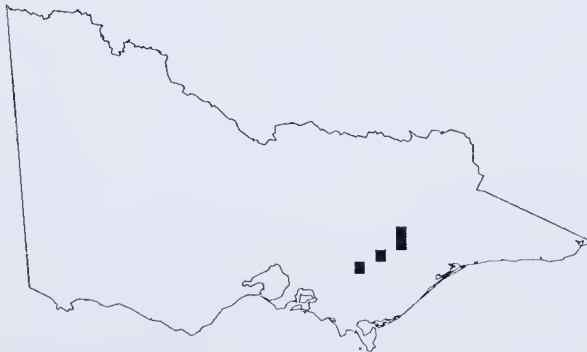


Fig. 2. Distribution of *Monotoca oreophila*.

tasmanica. The more exposed and drier cliff edge population at Nelsons Crag supports a different range of associated species including *Grevillea miqueliana*, *Leptospermum brevipes*, *Monotoca scoparia*, *Westringia senifolia*, *Callistemon pallidus* and *Derwentia perfoliata*.

NOMENCLATURE

Monotoca oreophila is listed by Ross (1993) as *M. sp. aff. elliptica* (Alps). Reference to this entity dates back to Bentham (1868), who assigned specimens to either a small-flowered mountain population of *M. elliptica* (Smith) R.Br. (based on *F. Mueller's* specimen from the Baw Baws) or to his new taxon *M. scoparia* (Smith) R.Br. var. *submutica* (based on *F. Mueller's* specimen from Mount Useful).

Mueller's Mount Useful specimen is one of two collections cited by Bentham in the protologue of *M. scoparia* var. *submutica*, the other being a collection of C. Stuart's gathered on Mount La Perouse in Tasmania. The two collections are discordant. Jarman and Crowden (1978) elevated Bentham's variety to specific rank as *M. submutica*, and recognised two Tasmanian varieties, the var. *autumnalis* being described as new. They cite Stuart's specimen from Mount La Perouse (housed at K) as the holotype of the basionym *M. scoparia* var. *submutica*. An additional two specimens collected by Stuart on Mount La Perouse and seen by Bentham are housed at the National Herbarium of Victoria (MEL). In the strict sense Stuart's specimen at Kew is not the holotype but one of several syntypes representing two different elements. Fortunately Stuart's collection conforms more closely to the protologue than does Mueller's specimen from Mount Useful because the leaves are 'scarcely mucronate'. In order to extricate the Mount Useful specimen from *M. submutica sensu stricto* so that the entity it represents can be described, one of Stuart's Mount La Perouse specimens housed at MEL is here selected as the lectotype of *M. submutica* (*M. scoparia* var. *submutica*).

Monotoca submutica (Benth.) S.J. Jarman, *Pap. Proc. R. Soc. Tasm.* 112: 1 (1978).

BASIONYM: *Monotoca scoparia* (Smith) R.Br. var. *submutica* Benth., *Fl. Austral.* 4: 231 (1868). LECTOTYPE (here selected): Ascent of Mount La Perouse, Tasmania, 1877, C. Stuart (MEL 74671).

DISCUSSION

Plants in all but one population have a low stature, rarely exceeding 1 m high. The Mt Useful population is comprised of unusually tall plants to 2.5 m high, but are typical in all other respects.

Monotoca oreophila has been confused with *M. submutica*, *M. scoparia* and *M. elliptica s. lat.*, but only bears a particularly close relationship to the latter. *M. oreophila* is readily distinguished from *M. submutica* by the pungent rather than innocuous leaf apices, strictly single-flowered uniflorescences and by the anthers that do not become strongly concave abaxially after the pollen is shed. *M. scoparia* differs from *M. oreophila* in several characters including the presence of a lignotuber, spicate uniflorescences and male corollas with the tube longer than (rarely almost equal to) the lobes.

The combination of strictly single-flowered uniflorescences, pungent leaves, single-celled ovaries and red fruit in *M. oreophila* suggest a close relationship with *M. elliptica s. lat.* The taxonomy of *M. elliptica* is still unresolved but there appears to be some merit in resurrecting *M. albens* R.Br. at some taxonomic level for the small-flowered populations occurring along the eastern edge of the New South Wales southern tablelands from Mt Imlay north to the Blue Mountains. *M. elliptica s. str.* occurs exclusively in near-coastal areas from north-eastern Tasmania to north of Sydney. Further evidence possibly corroborating the close relationship between *M. oreophila*, *M. 'albens'* and *M. elliptica* comes from their relationship with a particular species of butterfly. Despite there being no overlap in the distributional ranges of *M. oreophila*, *M. 'albens'* and *M. elliptica*, all three taxa are important food plants for the larvae of *Neolucia mathewi* (Mathew's Blue Butterfly). Based on current knowledge the larvae of *N. mathewi* appear to be restricted exclusively to the *M. oreophila*-*M. 'albens'*-*M. elliptica* group despite the presence of several other species of *Monotoca* within its range.

Further field searches for the occurrence of *Neolucia mathewi* on other species of *Monotoca* are required to test this hypothesis.

M. oreophila differs from both *M. elliptica* s. str. and *M. 'albens'* in features of the confluence and overwintering SGU buds. In *M. oreophila* the axis of the confluence is blastotelic, so that the leafy portion of the current SGU grows out before or during anthesis. Exceptionally rarely do a few confluences simulate a short raceme due to the SGU meristem aborting. In *M. elliptica* and *M. 'albens'*, most or all confluences simulate racemes. These raceme-like confluences are either terminated by a flower and all bracts are caducous, or sometimes the axis extends just beyond the uppermost uniflorescence and the uppermost bracts and/or leaves are short, broad and persistent. These axes contribute little to seasonal extension growth. Few if any confluences are blastotelic (exceptionally rarely blastotelic and raceme-like confluences equal in proportions, but then longer leaves exceeding 11 mm long), most extension growth being attributable to sterile SGU's.

Correlated with confluence structure is the size of the overwintering SGU buds. In *M. oreophila* the SGU buds just prior to shooting are large, tinged reddish-brown and enclose the SGU axis with flower buds and rudimentary leaves. In *M. elliptica* and *M. 'albens'* the SGU buds just prior to shooting are smaller, brown and usually enclose only the SGU axis with flower buds.

M. oreophila further differs from *M. elliptica* s. str. in having denser, shorter (3.8–11 mm long, cf. 9–23 mm long) and narrower leaves (1.4–2.8 mm wide, cf. 2.4–6.5 mm wide); shorter corolla tubes (in male flowers 0.4–0.8 mm long, cf. (0.8–)1–1.5 mm long); shorter anthers (0.8–1.2 (–1.3) mm long, cf. (1.1–)1.2–1.9 mm long); and in habitat preference (montane-subalpine, cf. coastal). *M. oreophila* further differs from *M. 'albens'* in having white-cream rather than generally pale yellow-green corollas and in its leaves that are denser (5–15 per cm, cf. 3–8 per cm) and slightly shorter (longest leaves < 11 mm long, cf. usually > 11 mm long).

Monotoca billawinica Albr., sp. nov.

Monotoca glaucae (Labill.) Druce affinis sepalis et corolla et antheris longioribus et colore fructus differt: ab *Monotoca scoparia* (Smith) R.Br. habitu robustiore, lignotubere absente, foliis latioribus et inflorescentia dissimili differt.

TYPUS: Victoria, Grampians, near the start of the Mt Thackeray walking track, Victoria Range, 37°18'20"S, 142°20'E, 3 April 1988, D.E. Albrecht 3536 [HOLOTYPE (functionally male): MEL 712598; ISOTYPE (functionally male): MEL 712597, HO, K, NSW; PARATYPE (female): MEL 712599; ISOPARATYPE: HO, K, NSW.

Densely branched non-lignotuberous shrub or small tree 2–4.5 m high; bark persistent, ultimately rough and fissured; current seasons branchlets brown or reddish-brown, glabrous or with an indumentum of minute stiff spreading hairs c. 0.05 mm long, ± glabrescent by second year. *Leaves* erect to spreading, flat to convex, elliptic, rarely lanceolate or oblanceolate, (7–)9–17(–26) mm long, (2.1–)2.3–4(–4.2) mm wide, rigid, lower surface distinctly whitish (due to numerous wax covered papillae) with branched subparallel-palmate veins; margins entire, plane to slightly recurved; apical mucro 0.6–1.7 mm long, pungent; petiole (0.8–)1–2.1 mm long, glabrous on abaxial surface. *Confluence* consisting of single-flowered axillary uniflorescences (lacking a subsidiary rudimentary bud) and/or 2–8-flowered (plus rudimentary bud) axillary spicate uniflorescences borne on current seasons SGU; lowermost spikes (1.4–)1.7–5(–6) mm long including peduncle (0.2–)0.6–2.7 mm long, proximal sterile bracts absent or very rarely 1–2 present; when uniflorescences spicate bracts persistent on spike axis, the lowest 0.5–1.1 mm long, when uniflorescences single-flowered bracts caducous or persistent and leaf-like; bracteoles (0.7–)0.8–1.4 mm long, inserted immediately or shortly below the sepals; female and functionally male flowers on separate plants. *Sepals* 5, (1.2–)1.3–1.8(–1.9) mm long, ciliolate. *Corolla* 5-lobed, whitish-cream, campanulate, 2.4–3.1 mm long in male flowers including tube 1–1.8 mm long; 1.6–2.3 mm long in female flowers including tube 0.7–1.2 mm long; lobes finally recurved, glabrous or occasionally papillose adaxially, c. equal in length to the tube. *Anthers* 1.2–1.9 mm long,

attached above the midpoint on very short filaments, exerted from the corolla tube at maturity and tending to block the throat of the tube, not becoming deeply concave abaxially after dehiscence; stamens reduced to filaments in female flowers. *Nectary* annular, 0.2–0.5(–0.65) mm long, shallowly lobed. *Ovary* 1-locular, tapering to a short style and small lobed stigma, together 0.9–1.3(–1.5) mm long. *Drupe* orange-red when fully ripe, ovoid to spherical, c. 2.5–3 mm long (excluding style), 2.3–3.3 mm wide. (Fig. 3)

FLOWERING PERIOD
February to April

FRUITING PERIOD
November to April

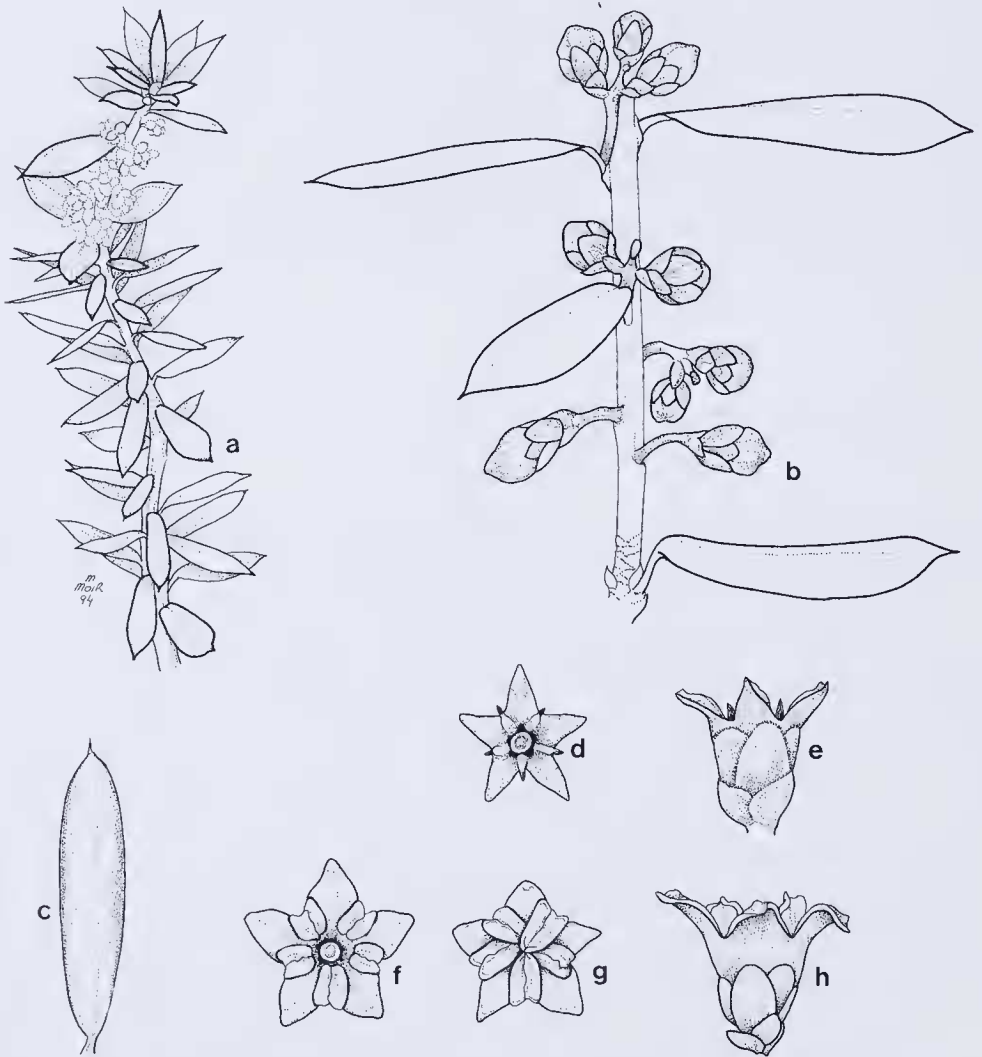


Fig. 3. *Monotoca billawinica*. a — flowering twig, $\times 1$. b — proximal part of confluence with single-flowered and spicate uniflorouscences, $\times 4$. c — leaf, $\times 3$. d & e — female flower, $\times 6$. f, g, h — functionally male flower (f — immature, g — mature), $\times 6$. All drawn from D.E. Albrecht 3536.

ETYMOLOGY

The specific epithet is derived from *Billawin*, the local Koorie name for the Victoria Ranges in the western Grampians (Gariwerd) where the species is most abundant.

REPRESENTATIVE SPECIMENS (61 specimens examined):

Victoria — Grampians: Victoria Range, Victoria Range road at junction of Mt Thackeray track, 3 Nov. 1987, *M.G. Corrick 10268* (MEL 1575576, CBG, HO); Victoria Range, on top, Victoria Range track, 1972, *A.C. Beaglehole 43296* (MEL 517468, AD 97821337); Victoria Range, in ravines near summit of Castle Rock, 11 Dec. 1966, *J.H. Willis s.n.* (MEL); Victoria Range, c. 1 km SW along the Victoria Range track from the intersection with the Victoria Range Rd, 4 Apr. 1988, *D.E. Albrecht 3540* (MEL, HO, CBG, AD, BRI); Victoria Range, Victoria Range track c. 2.5 km SW of gate at junction leading to Victoria Range road, 20 Apr. 1987, *M.G. Corrick 10222* (MEL 688979, HO, CBG, NSW); Mt Difficult area, 2.8 km on 308° T. from boat ramp at SW of Lake Wartook, 15 Oct. 1986, *J. Westaway 357 & A.F. Pyrke* (MEL 112395); Mt Difficult Range West, lower slopes on SW side of Lake Wartook near Chinamans track, 2 Nov. 1988, *M.G. Corrick 10430* (MEL 1559801, NSW, HO); Mt Difficult area, 450 m W. of intersection of Carters track and Longpoint fire line, 15 Oct. 1986, *J. Westaway 366 & A.F. Pyrke* (MEL 112396); 3 km N. of Cranges, 2 Apr. 1988, *D.E. Albrecht 3530* (MEL, HO, CANB).

DISTRIBUTION AND CONSERVATION STATUS

Monotoca billawinica is a Grampians endemic (Fig. 4), where it is restricted to two rather small areas — on summit ridges of the Victoria Range from the Chimney Pot north to Mt Thackeray, and in the Mt Difficult Range to the east of Wartook Reservoir. Population sizes throughout its range are variable and although its entire range is within the Grampians National Park, and in places it is locally abundant, it should be regarded as rare. Applying the coding system of Briggs and Leigh (1989) *M. billawinica* is assigned a risk code of 2RCa.

As *M. billawinica* lacks a lignotuber it is likely to be fire sensitive and therefore is potentially threatened by too frequent fires. Observations on the impact of successive wildfires on populations of *M. elliptica* (another non-lignotuberous species) in Royal National Park near Sydney suggests that populations can disappear from areas if they are burnt too frequently. As parts of the Grampians are subject to rather frequent fires, careful consideration must be given to the impact of fire on this species.

HABITAT

Monotoca billawinica occurs at altitudes ranging from 280–950 m, although it is most plentiful at the higher end of this spectrum. All populations occur on sandstone, and edaphic conditions range from poor soil development with abundant surface rocks to fairly well developed sandy loams. Structural vegetation types supporting populations of *M. billawinica* include shrubland, woodland and wet or dry sclerophyll forest. A diverse range of understorey species occur with *M. billawinica* and frequently associated overstorey species include *Eucalyptus baxteri*, *E. obliqua* and *E. alaticaulis*.



Fig. 4. Distribution of *Monotoca billawinica*.

DISCUSSION

Monotoca billawinica is the entity listed as *M. sp.* (Grampians) by Ross (1993). This species will be examined in more detail in a forthcoming paper dealing with morphometrics and phytochemistry of *Monotoca* species with single-celled ovaries, pungent leaves and spicate uniflorescences.

Monotoca billawinica closely resembles the allopatric *M. glauca* (Labill.) Druce, and has been confused with the sympatric *M. scoparia* (Smith) R.Br. From *M. glauca* it differs in having longer sepals (1.2–1.9 mm long, cf. 0.6–1.3 mm long); longer corollas (in male flowers 2.5–3 mm long, cf. 1.5–2.2 mm long); longer anthers (1.3–1.8 mm long, cf. 0.6–1.1 mm long); distal leaves with petioles that are glabrous (cf. usually puberulent) on the abaxial surface; and fruit that are red-orange (cf. translucent greyish) when fully ripe and have a longer maturation period.

Monotoca billawinica differs from *M. scoparia* in its more robust habit (*M. scoparia* not exceeding 2m high); absence of a lignotuber; longer peduncles (lowermost spikes with peduncles 0.6–2.7 mm long, cf. usually < 0.6 mm long); usual absence of sterile bracts towards base of peduncle in lower spikes (rarely 1 present, cf. usually 2 present); exerted anthers (cf. usually enclosed or half-exserted); broader leaves (usually 2.3–4.2 mm wide, cf. usually 1–2.6 mm wide); and in its leaf flavonoids. The two species are known to hybridise.

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